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SECURITY B
TSMC RESTRICTED

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TO：台灣積體電路製造股份有限公司
周蕙郁小姐

日期：2003/6/17

國別：台灣

FROM：承辦人 鄭育婷 (分機218)
專利部 鄭士如經理(分機309)

客戶編號/案件名稱: TSMC-2-01-1488

本所編號：NP-0763-TW

依 貴公司5月29日之E-MAIL指示:協助翻譯本案之引證資料-"VLSI製造技術"，今，隨函檢附英譯資料一份，敬請查收。如有任何問題，歡迎隨時與本所聯絡。耑此 順頌

商祺

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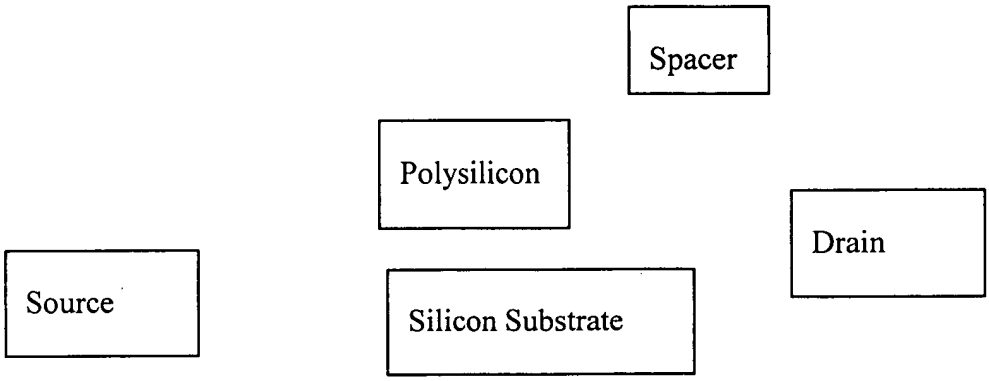

Fig. 6-10 shows a spacer located on the structure of MOS transistor.

Since the step coverage capability of TEOS- SiO_2 is excellent, a SiO_2 LPCVD reaction mainly using TEOS has been widely adopted in the semiconductor industry, such the space shown in Fig. 6-10. Since the metal layer used as a contact is not deposited yet while the spacer is formed, the reaction temperature in (6-18) does not have great influence on the process forming the device or on other properties of the device, such as the distribution of dopant. However, after the deposition of metal is performed, the reaction temperature required in equation (6-18) will limit the application of SiO_2 LPCVD using TEOS, and in stead, a plasma CVD of SiO_2 featured in the temperature less than 400℃ will be used (regarding the fabrication of the space shown in Fig. 6-10, please refer to Section 11-2-2).

The plasma CVD is meant to use plasma to decompose the reaction gas molecule participating in the CVD reaction into atoms, ions or radicals, thereby performing a CVD film deposition technique under a relatively low temperature by the deposition reaction. Equation (6-19) lists a PECVD reaction[14] using SiH_4 and N_2O as the reaction gas, wherein the fundamental operation conditions and the properties of PECVD SiO_2 are listed in Table 6-1. Since the reaction gas molecule participating in the reaction contains hydrogen atoms and nitrogen atoms, the SiO_2 film formed by PECVD will contain H and N, wherein the content of H is particularly apparent, which

is generally in the range of about 2-9 atomic %[15]. Basically, the aforementioned content is closely related to the reaction temperature, RF power and the flow ratio of N_2O vs. SiH_4, and has an effect on the density[15][16] of PECVD SiO_2 film.